

SHIP PRODUCTION COMMITTEE
FACILITIES AND ENVIRONMENTAL EFFECTS
SURFACE PREPARATION AND COATINGS
DESIGN/PRODUCTION INTEGRATION
HUMAN RESOURCE INNOVATION
MARINE INDUSTRY STANDARDS
WELDING
INDUSTRIAL ENGINEERING
EDUCATION AND TRAINING

September 1981
NSRP 0008

THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

**Proceedings of the IREAPS
Technical Symposium**

**Paper No. 28:
U.S. Shipbuilding Standards
Program: Long-Range Plan**

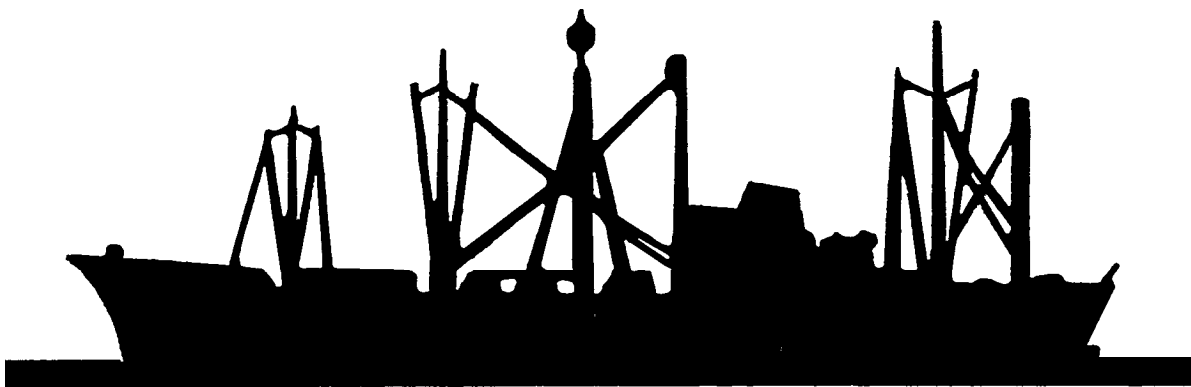
U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE SEP 1981		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE The National Shipbuilding Research Program Proceedings of the REAPS Technical Symposium Paper No. 28: U.S. Shipbuilding Standards Program: Long-Range Plan				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Surface Warfare Center CD Code 2230 - Design Integration Tools Building 192 Room 128 9500 MacArthur Blvd Bethesda, MD 20817-5700				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 48	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

DISCLAIMER

These reports were prepared as an account of government-sponsored work. Neither the United States, nor the United States Navy, nor any person acting on behalf of the United States Navy (A) makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness or usefulness of the information contained in this report/manual, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or (B) assumes any liabilities with respect to the use of or for damages resulting from the use of any information, apparatus, method, or process disclosed in the report. As used in the above, "Persons acting on behalf of the United States Navy" includes any employee, contractor, or subcontractor to the contractor of the United States Navy to the extent that such employee, contractor, or subcontractor to the contractor prepares, handles, or distributes, or provides access to any information pursuant to his employment or contract or subcontract to the contractor with the United States Navy. ANY POSSIBLE IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR PURPOSE ARE SPECIFICALLY DISCLAIMED.

Proceedings
IREAPS Technical Symposium
September 15-17, 1981
Baltimore, Maryland



INSTITUTE FOR RESEARCH AND ENGINEERING FOR AUTOMATION AND PRODUCTIVITY IN SHIPBUILDING

IREAPS

U. S. SHIPBUILDING STANDARDS PROGRAM
LONG-RANGE PLAN

Yoshinori Ichinose
Vice President
IHI Marine Technology Inc
New York, New York

ABSTRACT

Ishikawajima-Harima Heavy Industries/IHI-Marine Technology is developing a long-range plan for the U. S. shipbuilding standards program under a sub-contract with Bath Iron Works Corporation acting in its capacity as manager of the Ship Producibility Program.

Primary emphasis of the long-range plan is directed at near term (2 to 3 year) priorities to achieve maximum benefits at both industry and individual shipyards levels. Secondary emphasis is aimed at developing midterm (5 to 7 year) and long-term (10 to 20 year) goals to serve as planning guidelines for ongoing efforts.

The basic goals and objectives of the U. S. shipbuilding standards program long-range plan are summarized. Included are such examples as the need to reduce design and engineering cycle time costs, the need to shorten manufacturing lead times for critical materials, and the desirability of implementing outfit unit construction and accuracy control concepts. The recommended organizational infrastructure for standards development is addressed, and appropriate divisions of responsibility among ASTM Committee F-25 on standards, SNAME Panel SP-6 on standards and specifications, the government, shipbuilders, regulatory agencies, supporting industries and other concerned parties are discussed.

TASK S-29 U.S. SHIPBUILDING STANDARDS LONG-RANGE PLAN

1. TASK OBJECTIVE

- A. PROVIDE GUIDELINE FOR THE U.S. SHIPBUILDING INDUSTRY TO ESTABLISH THEIR SHIPBUILDING STANDARDS LONG-RANGE DEVELOPMENT PLAN, BASED UPON THE KNOWLEDGE AND EXPERIENCE OF THE JAPANESE SHIPBUILDING INDUSTRY ON STANDARDIZATION
- B. DIRECT PRIMARY EMPHASIS AT SHORT-TERM(2-3) YEARS) PRIORITY GOALS TO ACHIEVE MAXIMUM BENEFITS AT BOTH INDUSTRY AND INDIVIDUAL COMPANY LEVELS.
- C. PLACE SECONDARY EMPHASIS ON DEVELOPMENT OF MID-TERM (5-7) YEARS) AND LONG-TERM (10-20 YEARS) GOALS TO SERVE AS PLANNING GUIDLINES FOR ONGOING EFFORTS.

2. APPROACH

- A. CONDUCT A BACKGROUND SURVEY OF THE SHIPBUILDING INDUSTRY TO INVESTGATE THEIR NEEDS FOR STANDARDIZATION, AND THE STATUS-QUO OF STANDARDIZATION EFFORTS IN U. S. A.
- B. CATEGORIZE STANDARDS BY THEIR INFLUENCE TO THE INDUSTRY (I. E. , NATIONAL, INDUSTRY, COMPANY LEVELS) AND BY THEIR FUNCTIONS (I. E. , PRODUCTS, DESIGN/ENGINEERING, PERFORMANCE, TESTING/INSPECTION, PRODUCTION, ACCURACY STANDARDS).
- C. ORGANIZE AND CATEGORIZE STANDARDS ITEMS IN A FORM OF A "TREE STRUCTURE".
- D. SELECT AND PRIORITIZE STANDARDS ITEMS FROM THE "TREE STRUCTURE, AND CLASSIFY INTO SHORT-TERM, MID-TERM, LONG-TERM GOALS.
- E. PROVIDE GUIDELINES. FOR- RESPONSIBLE ORGANIZATIONAL STRUCTURES TO DEVELOP AND IMPLEMENT STANDARDS, CODING, ETC.

3.

STANDARDS CATEGORIES BY PREDOMINATE LEVELS

NATIONAL STANDARDS

STANDARDS ENFORCED By GOVERNMENT RULES/REGULATIONS.

FEATURES:

STANDARDS INTERRELATED TO INTERNATIONAL STANDARDS, RULES/REGULATIONS (ISO, IMCO, IACS, ETC.) AND/OR FEDERAL REGULATIONS (USCG, USN, ETC.)

EXAMPLES :

UNITS, CODES, LIFE SAVING EQUIPMENTS, FIRE APPLIANCES, ANCHORS, VALVES, ETC.

INDUSTRY-WIDE VOLUNTARY STANDARDS

STANDARDS ESTABLISHED BY PRIVATE ORGANIZATIONS ACCEPTED BY THE INDUSTRY (ASTM, SNAME, IEEE, ETC.)

FEATURES:

STANDARDS USED NATION-WIDE BY THE INDUSTRY AS CRITERIA OR YARDSTICKS,

EXAMPLES:

DESIGN CRITERIA/SPECIFICATIONS, FITTINGS, EQUIPMENT, QUALITY, TESTING/INSPECTION, PERFORMANCE.

COMPANY IN-HOUSE STANDARDS

STANDARDS ESTABLISHED BY INDIVIDUAL COMPANIES.

FEATURES:

STANDARDS TO MEET COMPANY'S PECULIAR REQUIREMENTS.

EXAMPLES:

DESIGN/ENGINEERING, PRODUCTION, TESTING/INSPECTION, MATERIALS, MODULES, MANUALS, ETC.

4. CATEGORIZATION BY FUNCTIONS

PRODUCTS STANDARDS

BASIC FITTINGS, EQUIPMENTS, ETC. ,
COMMONLY USED IN SHIP'S SYSTEMS.

EXAMPLES:

ANCHORS, BITTS, DOORS, PIPE JOINTS
LIGHTING FIXTURES, ETC.

DESIGN/ENGINEERING
STANDARDS

DESIGN' CRITERIA, SPECIFICATIONS,
ETC. , FOR SHIP'S SYSTEMS.

EXAMPLES:

STANDARD SPECIFICATIONS, CALCUL-
ATION FORMS, . ANALYSIS METHODS, ETC.

FUNTIONAL PERFORMANCE
STANDARDS

STANDARD SPECS FOR MACHINERY AND
EQUIPMENT, MATERIALS, COMPONENTS.

EXAMPLES:

STANDARD PERFORMANCE SPECS FOR
LIFE BOATS, NAVIGATION EQUIPMENTS,
PUMPS, GENERATORS, SWITCHBOARDS,
VALVES, PAINTS, ETC.

TESTING/INSPECTION
STANDARDS

TESTING/INSPECTION PROCESSES,
ACCEPTANCE LEVELS, ETC.

EXAMPLES:

STANDARD PROTOCOLS OF SEA TRIALS,
SYSTEMS, STANDARDS FOR SURFACE
TREATMENT AND PAINTING, ETC.

PRODUCTION PROCESS
STANDARDS

CONSTRUCTION METHODS, OUTFITTING
METHODS, WELDING PROCESSES, ETC.

EXAMPLES:

STANDARD PROCESSES FOR HULL CON-
STRUCTION, PIPE FABRICATION, SHAFT
ALIGNMENT, ETC.

ACCURACY/TOLERANCE
STANDARDS

ACCEPTANCE LEVEL OF ACCURACY
TOLERANCE IN PRODUCTION.

EXAMPLES:

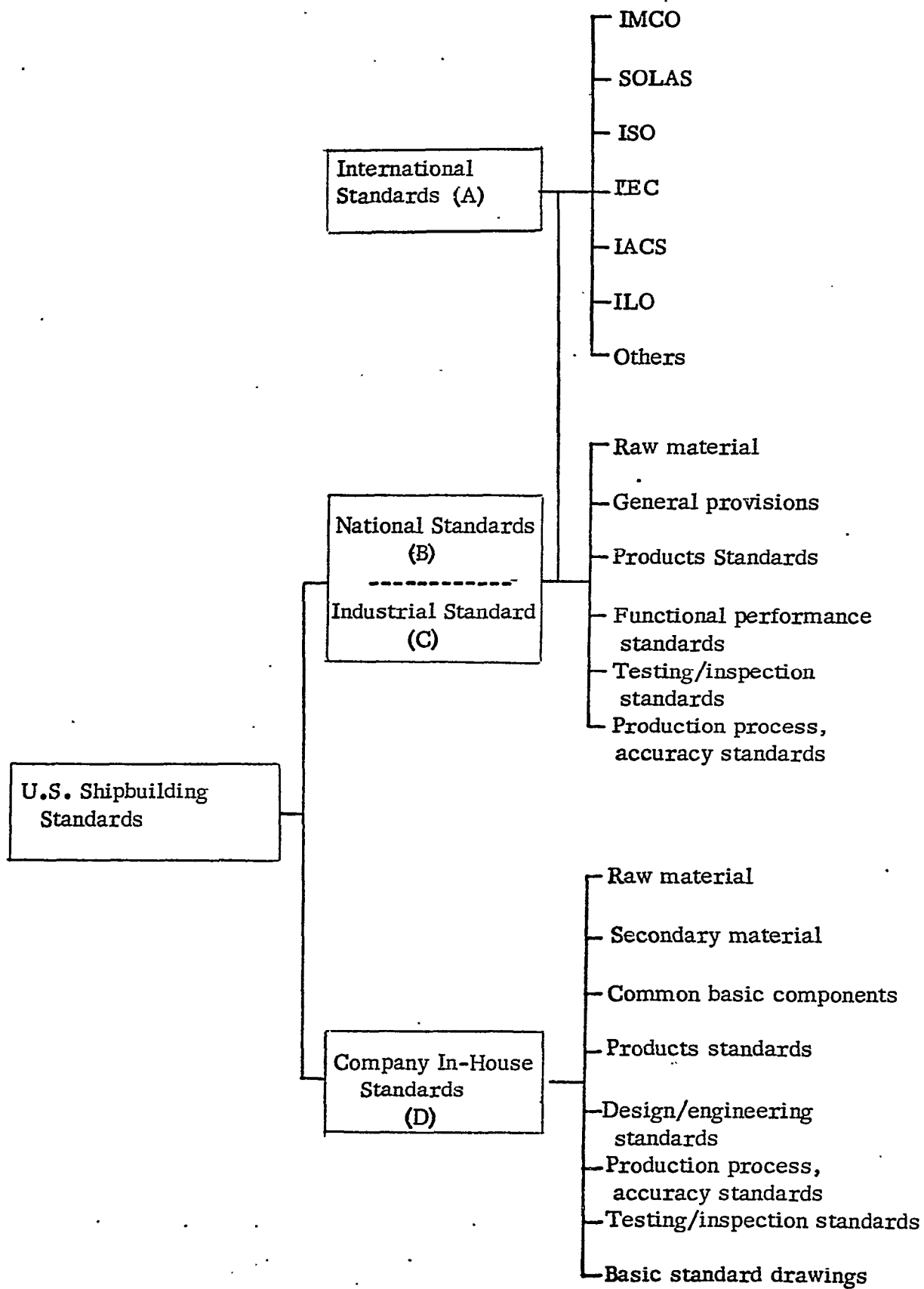
ACCURACY OF HULL STRUCTURE, PIPE
JOINTS, SHAFT ALIGNMENT, ETC.

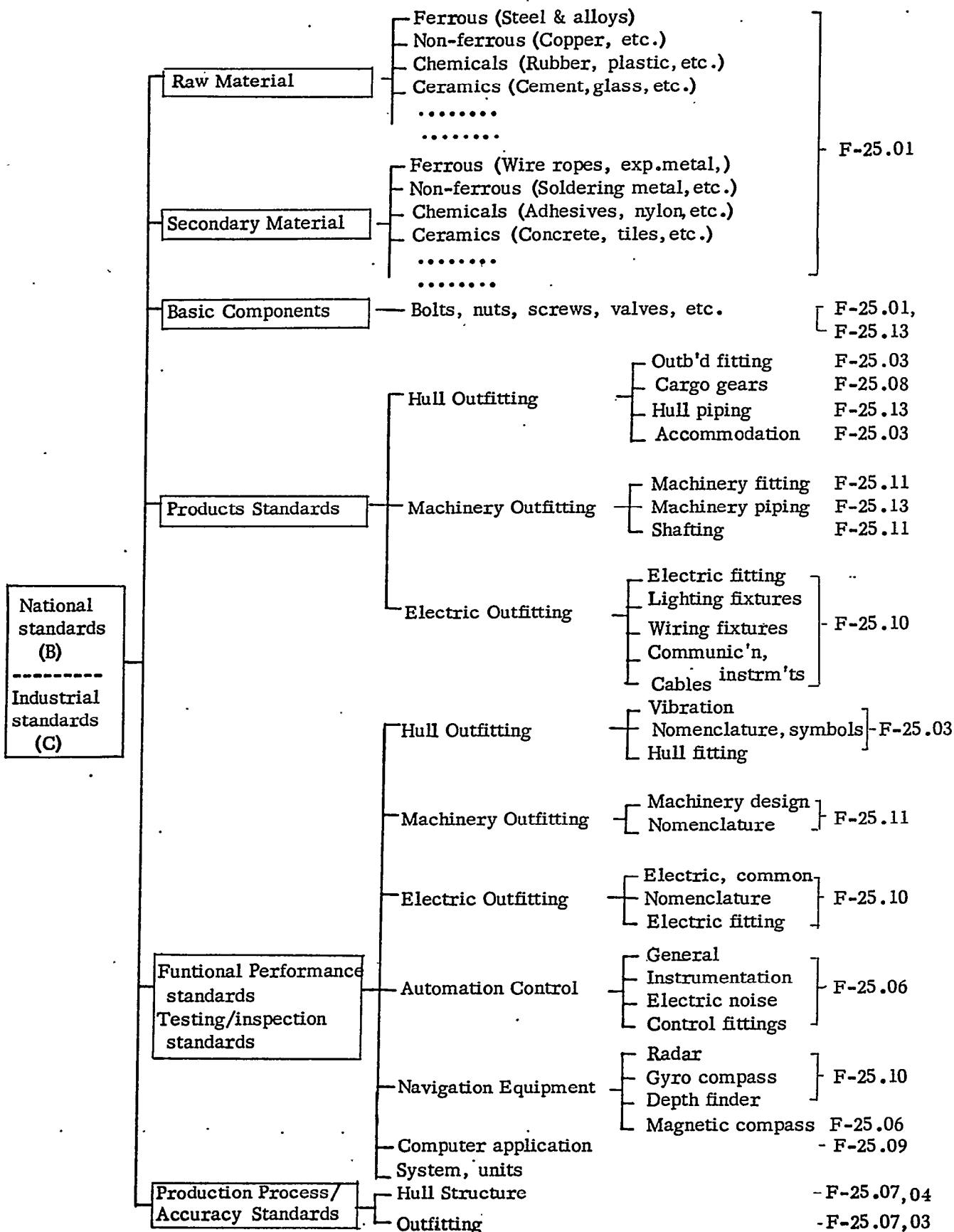
5. STANDARDS TREE STRUCTURE

PURPOSE: TO ORGANIZE AND SYSTEMATIZE ALL STANDARDS ITEMS, AND CLASSIFY THEM INTO STANDARDS CATEGORIES IN A FORM OF A TREE STRUCTURE TO IDENTIFY THE FAMILY GROUP THEY' BELONG TO.

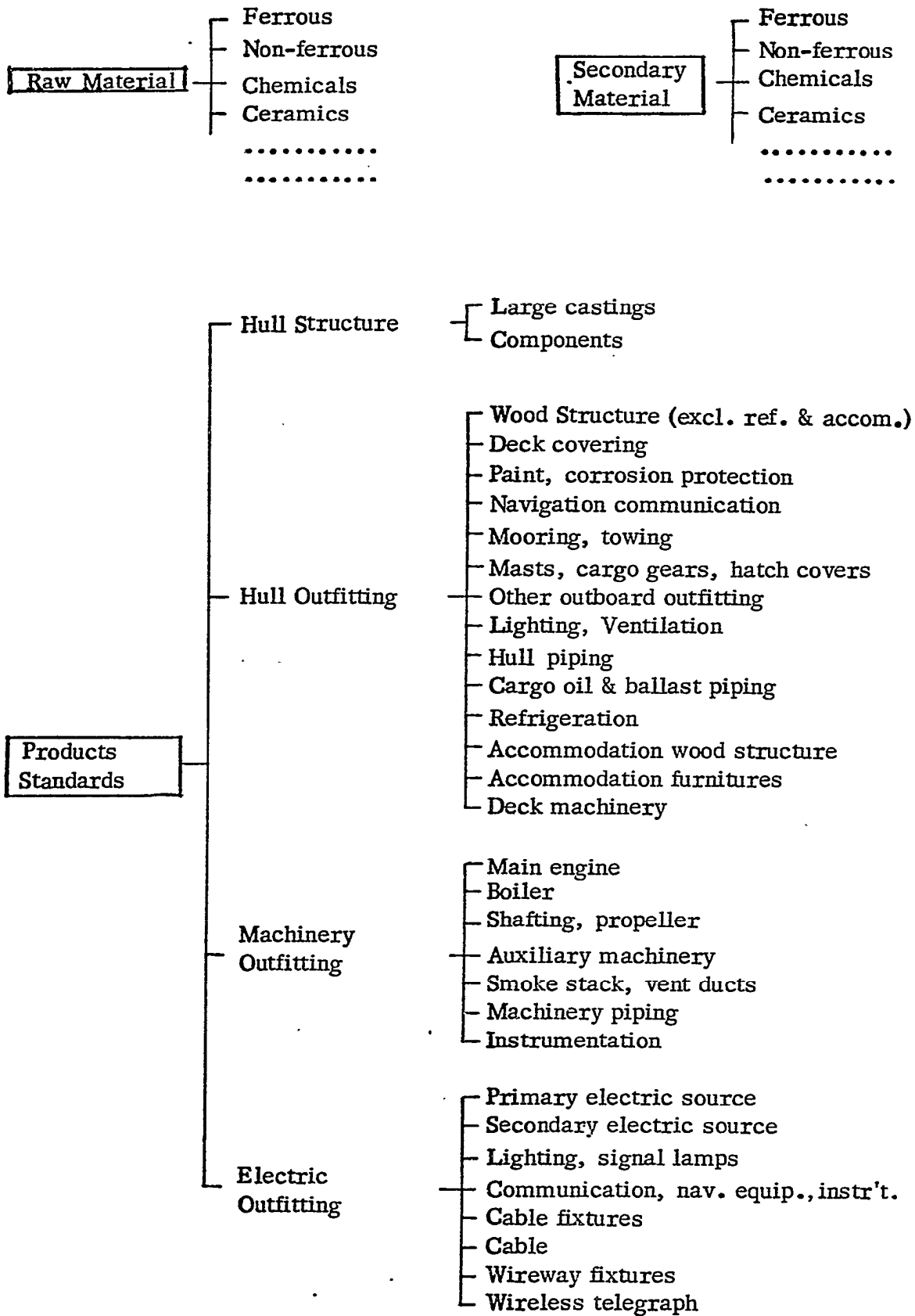
FORMAT: AT EACH STANDARDS LEVEL (NATIONAL, INDUSTRY, COMPANY LEVELS); CLASSIFY STANDARDS ITEMS INTO FUNCTIONAL GROUPS (PRODUCTS, DESIGN/ENGINEERING, ETC.) AND THEN INTO SYSTEMS OR WORK PROCESSES (HULL STRUCTURE, HULL OUTFITTING, ETC.), AND FINALLY INTO INDIVIDUAL ITEMS.

EXAMPLE OF TREE STRUCTURE

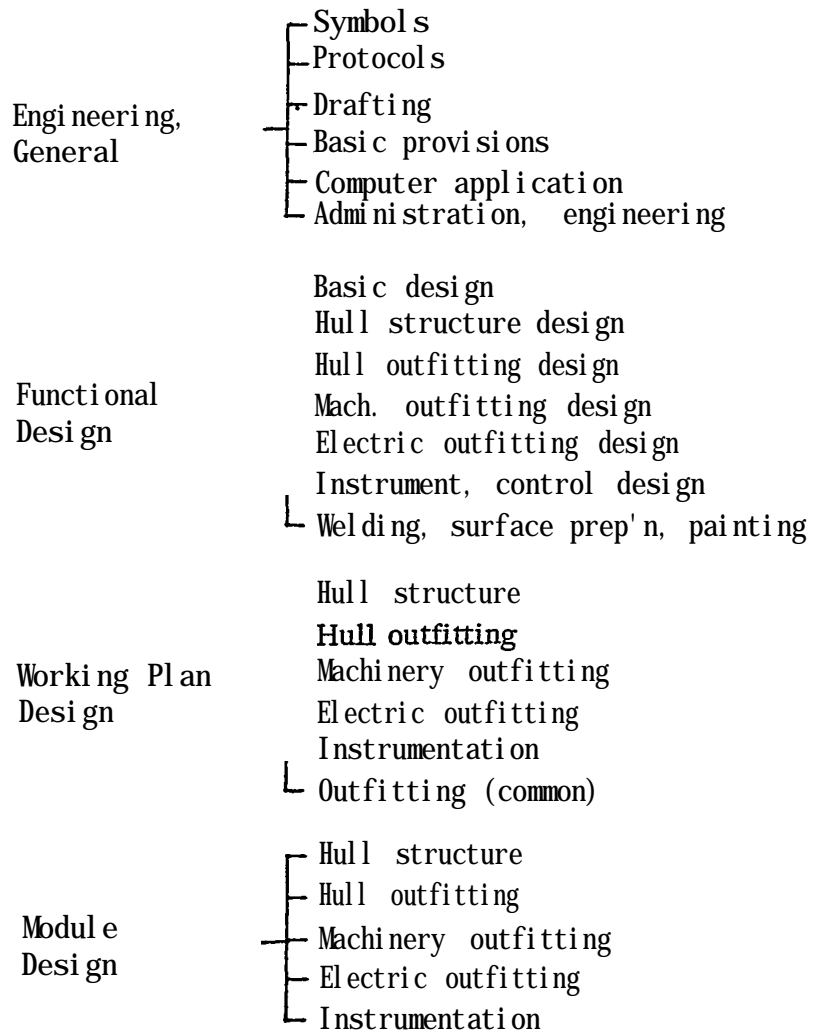
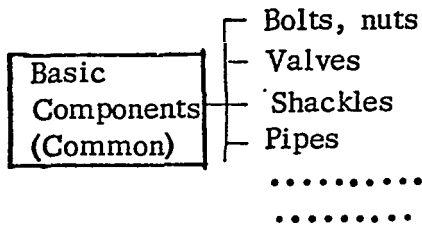




Company In-House Standards (D)



Company In-House Standards (D)



Design/ Engineering Standards

6. STANDARDIZATION GOALS

SHORT-TERM GOALS (2-3 YRS):

PRODUCTS STANDARDS

FUNCTIONAL PERFORMANCE STANDARDS

DESIGN/ENGINEERING STANDARDS (BASIC).

MID-TERM GOALS (5-7 YRS):

DESIGN/ENGINEERING STANDARDS (LONGER TERM)

TESTING/INSPECTION STANDARDS (BASIC)

PRODUCTION PROCESS STANDARDS (BASIC)

LONG-TERM GOALS (10-20 YRS):

DESIGN/ENGINEERING STANDARDS (LONGER TERM)

TESTING/INSPECTION STANDARDS (LONGER TERM)

PRODUCTION PROCESS STANDARDS (LONGER TERM)

ACCURACY/TOLERANCE STANDARDS

(1-25)

<u>Type of Standards</u>	<u>Major Users</u>	<u>Benefits</u>	<u>Circumstances</u>	<u>Development Time</u>	<u>Priority</u>
Product Standards	Shipyard Vendor Regulatory Bodies	Design Purchasing Inspection	Can be developed independently	Short	Short-term
Functional Performance Standards	Shipyard Vendor Regulatory Bodies	Design Purchasing Inspection	Can be developed independently	Short	Short-term
Design/Engineering Standards	Shipyard	Design Production	Should be based on proven standardized products	Need time to coordinate within industry or company	Short-term & Mid-term
Testing/Inspection Standards	Shipyard, Vendor, Shipowner Regulatory Bodies	Inspection Production	No restrains	Need time for coordination with the groups concerned	Mid-term & Long-term
Production Process Standards Accuracy Standards	Shipyard Shipowner Regulatory Bodies	Production Inspection	Will be enhanced if products/functional/design standards, etc. are established	Need time for coordination with the groups concerned	Mid-term & Long-term

7. ORGANIZATIONAL FOR STANDARDIZATION.

OBJECTIVE: TO DEFINE RESPONSIBILITIES AT EACH LEVEL FOR STANDARDS PLANNING, DEVELOPMENT, IMPLEMENTATION AND FOLLOW-UP.

FUNCTIONS REQUIRED:

- PLANNING & DETERMINATION OF LONG-RANGE PLAN
- DEVELOPMENT OF STANDARDS
- APPROVAL AND ENACTMENT OF STANDARDS
- PUBLICATION OF STANDARDS
- FOLLOW-UP & MAINTENANCE OF STANDARDS

BASIC TASK GROUP STRUCTURE:

- STANDARDS COMMITTEE: DETERMINE LONG-RANGE AND ANNUAL DEVELOPMENT PLANS, APPROVE FINAL DRAFT STANDARDS.
- DIVISIONAL COMMITTEES: ORGANIZED UNDER STANDARDS COMMITTEE BY FUNCTIONS TO DRAFT LONG-RANGE & ANNUAL DEVELOPMENT PLANS, EVALUATE DRAFT STANDARDS DRAFTED BY WORKING COMMITTEES.
- WORKING COMMITTEES: ORGANIZED UNDER EACH DIVISIONAL COMMITTEE TO DRAFT STANDARDS.

8. RECOMMENDED U. S. SHIPBUILDING STANDARDS LONG-RANGE PLAN

A. FINAL REPORT: FORMAT

VOLUME I: - EXECUTIVE SUMMARY
BACKGROUND CONSIDERATIONS &
GUIDELINES FOR STANDARDIZATION.

APPENDICES: - BACKGROUND SURVEY RESULTS.
JAPANESE APPROACH TO STANDARD-
IZATION IN SHIPBUILDING.

VOLUME II: - RECOMMENDED U. S. SHIPBUILDING
STANDARDS LONG-RANGE PLAN.
GUIDELINES FOR SELECTION AND
ASSESSMENT OF STANDARDS.
GUIDELINES FOR CODING AND COM-
PUTER APPLICATION.

APPENDICES: - STANDARDS TREE STRUCTURE.
LIST OF STANDARDS ITEMS CATEG-
ORIZED BY PRIORITY ORDERS.
STANDARDS PUBLICATION FORMAT
EXAMPLE OF SYSTEM CODES

VOLUME III: - CATALOGUE OF EXISTING SHIPBUILD-
ING STANDARDS, COMMERCIAL &
NAVY,

(E X A M P L E) S T A N D A R D I T E M S C A T E G O R I Z E D B Y P R I O R I T Y O R D E R S

APPENDIX C

EXPLANATIONS

1. RATIONALE

This column indicates the effects or benefits of standardization.

2 to 4 most effective rationales are selected for each standard.

- 01 - Improve communication, save labour
 (e.g. smoother negotiations, minimize conflicts)
- 02 - Improve approval work, save labour
 (e.g. simplify plan approval, shorten approval time)
- 03 : Improve inspection work, save labour
 (e.g. simplify/eliminate inspection, shorten inspection
 time, eliminate duplication)
- 04 - Improve design/engineering work, save labour
 (e.g. reduce engineering manhours, minimize design
 changes, improve accuracy of drawings)
- 05 - Improve purchasing work, save labour
 (e.g. simplify ordering, minimize estimation work)
- 06 - Improve production, save labour
 (e.g. improve productivity, reduce manhours)
- 07 - Stabilize or improve technology level
 (e.g. stabilize and improve engineering and production
 technology, eliminate inconsistency in design or speci-
 fications)
- 08 - Maintain or improve quality
 (e.g. maintain quality, improve reliability)
- 09 - Reduce cost
 (e.g. avoid over design, reduce tailor-made products) -
- 10 - Shorten delivery time
 (e.g. reduce purchasing time, allow stocks)

2. STATUS

This column indicates the organization, rule or regulation, institute, etc., issuing and controlling the standard.

3. CATEGORY

This column indicates characteristics of the standard.

N - National standard

I - Industry-wide standard

H - Company in-house standard

4. F-25 COMMITTEE

This column indicates the code number of ASTM F-25 sub-committees.

NO	ITEM	RATIO -NALE	STATUS	CATE -GORY	F-25 COMM
1	Manhole cover, Access hatch cover, etc.	02 04 05 08	MASS ABS ISO	I	03
2	Rigging, Lines, Blocks	02 04 05 08	MASS	I	03
3	Anchor	02 04 05 08	MASS ABS ISO	N	03
4	Anchor chain	02 04 05 08	MASS ABS ISO	N	03
5	Anchor chain controller	02 04 05 08	MASS ISO	N	03
6	Bitt, Bollard	02 04 05 08	PCC ISO	N	03
7	Chocks	02 04 05 08	PCC ISO	I	03
8	Eye plate, Ring plate	04 05 08 10	MASS DIN JIS	I	03
9	Handrail, Handrail stanchion	04 05 08 10	MASS ISO	I	03
10	Step, Vertical ladder	04 05 08 10	MASS ISO	I	03
11	Pilot ladder	02 04 05 08	ISO	N	03
12	Weather tight steel door	02 04 05 08	MASS ISO	I	03
13	Round scuttle, Window	02 04 05 08	MASS ABS ISO	I	03
14	Bottom plug	04 05 08 10	ISO	I	03
15					
16					
17					

Table - 1 Short-term Products Standards

N0	ITEM	RATIO -NALE	STATUS	CATE -GORY	F-25 COMM
1	Bosun store equipment (bosun chair etc.)	01 04 05 08	MASS JIS	I	03
2	Derrick boom	02 04 05 08	MASS ISO	I	03
3	Goose neck bracket	02 04 05 08	MASS ISO	I	03
4	Topping bracket	02 04 05 08	MASS ISO	I	03
5	Boom rest	04 05 08 09	MASS JIS	I	03
6	Fittings of bitter end of anchor chain	04 05 08 09	JIS	I	03
7	Fairleader	04 05 08 09	DIN JIS	I/H	03
8	Ladder and platform	04 05 08 09	MASS	I	03
9	Ladder and platform (tank, hold)	04 05 08 09	MASS	I	03
10	Ladder and platform (engine room)	04 05 08 09	MASS	I	03
11	Ladder (in accommodation)	04 05 08 09	MASS	I	03
12	Ship's side ladder for pilot	02 04 05 08	PCC	I	03
13	Door for accommodation	04 05 08 09	MASS	I	03
14	Door for store (non-tight door)	04 05 08 09	JIS	I/H	03
15	Inventories	04 05 08 10	MASS FED MIL	I/H	03
16	Fittings for store and work space (shelf etc.)	04 05 08 09	MASS FED	I/H	03
17	Hydrant box, Hose box	04 05 08 09	MASS ABS	I/H	03

Table - 2 Mid-term Products Standards

NO	ITEM	RATIO -NALE	STATUS	CATE -GORY	F-25 COMM
1	Side port	02 04 05 08	MASS	I/H	03
2	Water tight door	02 04 05 08	ABS JIS	I	03
3	Securing device for cargo hatch cover	04 05 08 09	MASS ABS	I/H	03
4	Mast, Derrick post	04 05 08 07	MASS ABS	H	03
5	Ventrisher (cargo/inert gas vent)	04 05 08 09	ABS	I	03
6	Pressure vacuum breaker	04 05 08 09	ABS	I	03
7	Rudder carrier	04 05 08 09	MASS ABS	I/H	03
8	Tanks (miscellaneous use)	04 05 08 09	-	I/H	03
9	Container lashing device	04 05 08 09	ABS	I/H	03
10					
11					
12					
13					
14					
15					
16					
17					

Table - 3 Long-term Products Standards

RECOMMENDED ORGANIZATIONAL STRUCTURE FOR STANDARDS DEVELOPMENT

A) National Standards

<u>Work Process</u>	<u>Responsible Organization</u>
- Planning, long-range plans goals	MarAd (commercial, actual planning assigned to SNAME SP-6)
- Development	ANSI (related to ISO) ASTM, F-25 (others)
- Approval/Authorization	SNAME SP-6.
- Enactment	MarAd
- Publication/Distribution	ANSI or ASTM
- Follow-up	SNAME SP-6 (actual work assigned to ANSI or ASTM)
- Recognition, re compliance w/international, Federal laws, regulations	U. S. C. G.

8 Industry Voluntary Standards

Work Process	Responsible Organizations
- Planning, long-range plan goals	SNAME SP- 6
- Development	ASTM F- 25
- Approval /Authorization	SNAME SP- 6
- Enactment	ASTM
- Publication	ASTM

03 502 5 2

F-25	TYPE OF	POTENTIAL	ORIGIN	NO. OF	RV	RF	SYNONYMS	SYNONYMS	SYNONYMS	MOD	SYSTEM	TSK									
COMM	SWBS	STANDARD	BENEFITS	CODE	STANDARD	YK	YK	ORIGU	STANDARD-1	YR	ORIGU	STANDARD-2	YR	ORIGU	STANDARD-3	YR	REQD	UNITS	NO		
S U B J E C T C A T E G O R Y										S T A N D A R D T I T L E											
C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-10	C-11	C-12	C-13	C-14	C-15	C-16	C-17	C-18	C-19	C-20		
03	582	5	2	DIN	81921	69												3	M	3	
BITT. BOLLARD AND CLEAT										BELAYING CLEATS FOR FIBRE ROPES											
03	582	5	2	HMN	62034	72												3	M	3	
BITT. BOLLARD AND CLEAT										BOLLARDS. SUMMARY											
03	582	5	2	JIS	F2001	75												3	M	3	
BITT. BOLLARD AND CLEAT										BOLLARDS											
03	582	5	2	DIN	81915	69												3	M	3	
CHOCK										MULTI-PURPOSE CHOCKS											
03	582	5	2	HMN	46002-1	72												3	M	3	
CHOCK										ROLLER CHOCK. SUMMARY											
03	582	5	2	JIS	F2003	68												3	M	3	
CHOCK										CAST IRON DECK END ROLLERS											
03	582	5	2	JIS	F2004	76												3	M	3	
CHOCK										STEEL PLATE DECK END ROLLERS											
03	582	5	2	JIS	F2005	75												3	M	3	
CHOCK										CLOSED CHOCKS											
03	582	5	2	JIS	F2017	75												3	M	3	
CHOCK										PANAMA CHOCKS											
03	582	5	2	DIN	81906	72												3	M	3	
FAIRLEAD										PEDESTAL FAIRLEADS (OLD MAN FAIRLEADS)											
03	582	5	2	HMN	46002-2	74												3	M	3	
FAIRLEAD										GUIDE ROLLER. SUMMARY											
03	582	5	2	JIS	F2014	69	75											3	M	3	
FAIRLEAD										FAIR-LEADS											

596

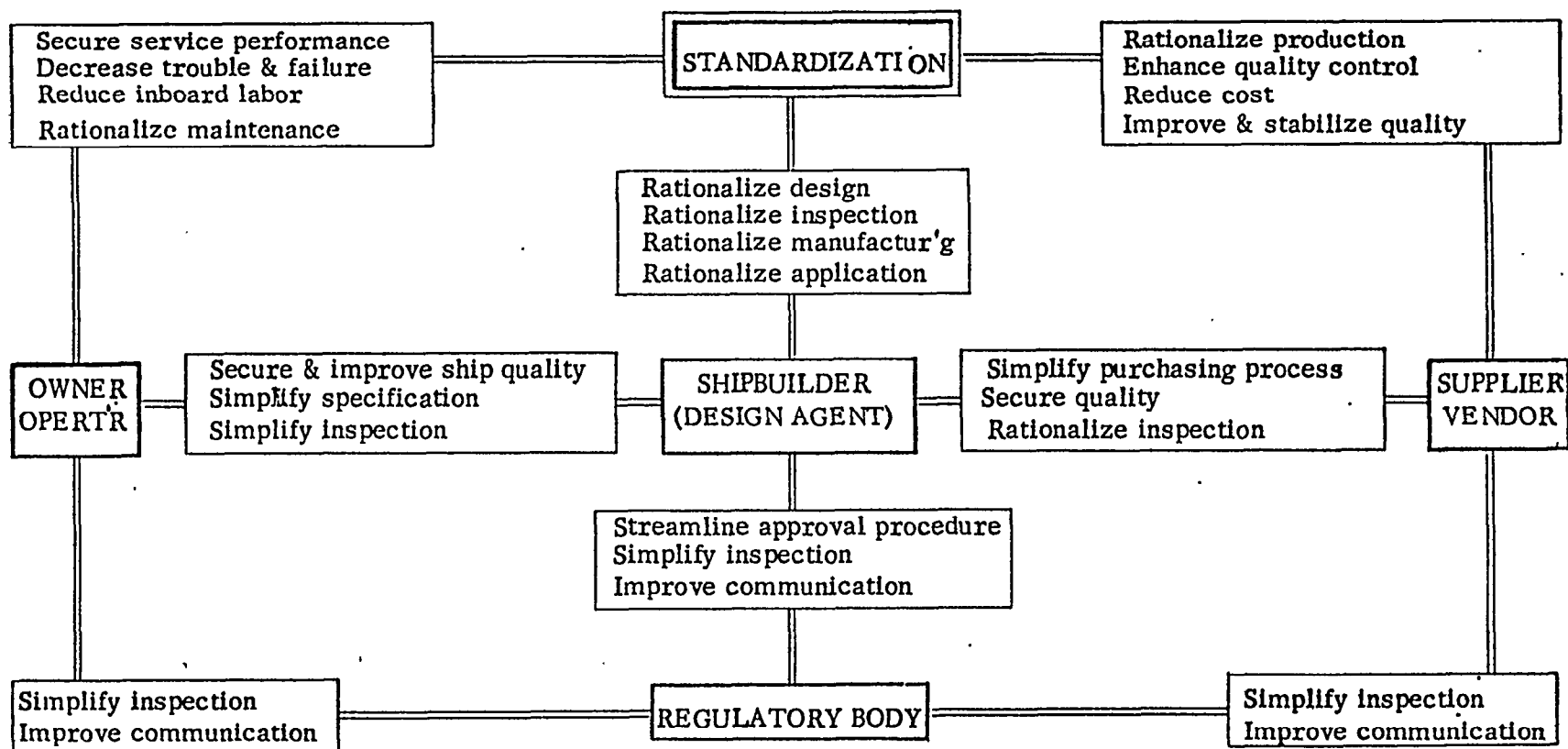


Figure 1-1 Effects of Standardization

APPENDIX A: IREAPS TECHNICAL SYMPOSIUM AGENDA

TUESDAY, SEPTEMBER 15

8:00	REGISTRATION	GRAND FOYER
13:30		

**9:15 GENERAL SESSION FRANCIS SCOTT KEY
BALLROOM, NORTH & CENTER**

**SESSION CHAIRMAN: J.R. Vander Schaaf
Bath Iron Works**

- **WELCOME**
J.C. Estes, Bethlehem Steel Corp.
 - **SHIP PRODUCTION COMMITTEE OVERVIEW**
E.L. Peterson, Peterson Builders, Inc.
- SHIP PRODUCTION COMMITTEE PANEL OVERVIEWS:**
- **SP-2 — Outfitting and Production Aids**
L.D. Chirillo, Todd Pacific Shipyards Corp.

10:30 INFORMAL DISCUSSION PERIOD

**11:00 GENERAL SESSION FRANCIS SCOTT KEY
BALLROOM, NORTH & CENTER
SESSION CHAIRMAN: E.L. Peterson
Peterson Builders**

SPC PANEL OVERVIEWS (contd)

- **SP-1 & 3 — Facilities and Environmental Effects**
R. Price, Avondale Shipyards, Inc.
- **A PROGRESS REPORT ON THE IREAPS PROGRAM**
E.R. Bangs, IIT Research Institute

12:00 LUNCH

**1:30 GENERAL SESSION FRANCIS SCOTT KEY
BALLROOM, NORTH & CENTER
SESSION CHAIRMAN: L.D. Chirillo
Todd Pacific Shipyards**

SPC PANEL OVERVIEWS (contd)

- **SP-4 — Design/Production Integration**
T.J. O'Donohue, Newport News Shipbuilding
- **Introduction-Ship Producibility Research Program**
J.C. Mason, Bath Iron Works Corp.
- **SP-6 — The National Shipbuilding Standards Program**
S.Wolkow, Bath Iron Works Corp.
- **SP-8 — The Shipbuilding Industrial Engineering Program**
J.R. Fortin, Bath Iron Works Corp.

3:00 INFORMAL DISCUSSION PERIOD

**3:30 GENERAL SESSION FRANCIS SCOTT KEY
BALLROOM, NORTH & CENTER
SESSION CHAIRMAN: E.R. Bangs
IIT Research Institute**

SPC PANEL OVERVIEWS (contd)
• SP-7 — Shipyard Welding
 B.C. Howser, Newport News Shipbuilding

- **0-23-1 — Surface Preparation and Coatings**
J. Peart, Avondale Shipyards, Inc.
- **SP-9 — Education**
H. Bunch, University of Michigan

5:15 RECEPTION GRAND FOYER
-6:15 Sponsored by: IIT Research Institute

WEDNESDAY, SEPTEMBER 16

8:00 REGISTRATION GRAND FOYER
-3:30

8:30 Concurrent Sessions

SESSION 1 **FRANCIS SCOTT KEY**
BALLROOM, NORTH & CENTER

SESSION CHAIRMAN: **P.M. Cofoni**
 General Dynamics

- **THE AUTOFIT CAD/CAM SYSTEM FOR PIPING ENGINEERING: OPERATIONAL EXPERIENCE AND DEVELOPMENT STATUS**
F. Dahle, Shipping Research Services A/S
- **AUTODRAW: AUTOKON'S INTERACTIVE GRAPHICS SYSTEM FOR VIEWING AND MANIPULATING STRUCTURAL MODEL DATA INTO COMPLETE DRAWING DOCUMENTATION**
F. van Cuilenborg, Shipping Research Services A/S
- **USING AUTOKON FROM EARLY DESIGN: RECENT EXPERIENCE FROM ACTUAL SHIP DESIGNS**
H. Oigaarden, Shipping Research Services A/S

SESSION 2	FRANCIS SCOTT KEY BALLROOM, SOUTH
SESSION CHAIRMAN:	R. Price Avondale Shipyards

- **JAPANESE SURFACE PREPARATION AND COATING METHODOLOGY AND MATERIALS**
G. Soltz, Consultant
- **IMPLEMENTATION OF PRODUCTION ENGINEERING TECHNIQUES**
M. Bell, A & P Appledore, Ltd.
L. Flora, Norshipco
- **A MANAGEMENT SIMULATOR FOR SHOP STORES IN THE U.S. NAVAL SHIPYARDS**
H.E. Warren, California State University —
Los Angeles

10:00 INFORMAL DISCUSSION PERIOD

10:30 Concurrent Sessions

SESSION 1 **FRANCIS SCOTT KEY**
BALLROOM, NORTH & CENTER

SESSION CHAIRMAN: J. Wasserboehr
National Steel
Shipbuilding

- U.S. NAVY CAD/CAM PROGRAM HULL
STRUCTURE (HULSTRX) DEVELOPMENT
OVERVIEW
D. Helgeson, Advanced Marine Enterprises, Inc.
E. Byler, Advanced Marine Enterprises, Inc.
- 1 BRITSHIPS - SHIPBUILDING CAD/CAM
IN PRODUCTIVE APPLICATION
I.M. Tolmie, British Ship Research Association
- A NATIONAL COALITION FOR THE
SHIPBUILDING TECHNOLOGY PROGRAM
F.W. Helming, SofTech, Inc.

SESSION 2 FRANCIS SCOTT KEY
BALLROOM, SOUTH

SESSION CHAIRMAN: J. Peart
Avondale Shipyards

- ECONOMIC BENEFITS AND TECHNOLOGY
OF CU/NI SHIP HULL SHEATHING
L.W. Sandor, The Franklin Research Center
L.M. Schetky, International Copper Research
Association, Inc.
E.W. Thiele, Copper Development Association
- A CNC SHEETMETAL FABRICATION
SYSTEM FOR PRODUCTION OF SHIPS
VENTILATION COMPONENTS AND
FLATWORK
T.R. Galie, Naval Ship Systems
Engineering Station
D. Blais, Bath Iron Works Corp.
- 1 SHIP STRUCTURAL COST PROGRAM
A. Furio, David W. Taylor Naval Ship
Research and Development Center

12:00 LUNCH

1:30 GENERAL SESSION FRANCIS SCOTT KEY
BALLROOM, NORTH & CENTER

SESSION CHAIRMAN: R.C. Moore
Newport News
Shipbuilding

- IMPLEMENTATION OF INTERACTIVE
GRAPHICS FOR STRUCTURAL DESIGN
AND PART DEFINITION
G. Panciera, General Dynamics
D. Palmer, General Dynamics
- HUMAN PERFORMANCE ENGINEERING
AS A GUARANTEED METHOD OF
PRODUCTIVITY INCREASE
D.C. Anderson, University of Notre Dame

3:00 INFORMAL DISCUSSION PERIOD

3:30 GENERAL SESSION FRANCIS SCOTT KEY
BALLROOM, NORTH & CENTER

SESSION CHAIRMAN: T.J. O'Donohue
Newport News
Shipbuilding

1 PRODUCTIVITY, NAVY STYLE
J.W. Tweeddale, U.S. Navy

1 QUALITY CIRCLES, DOING BUSINESS
BETTER AT THE PHILADELPHIA
NAVAL SHIPYARD
R. Bradley, Philadelphia Naval Shipyard

THURSDAY, SEPTEMBER 17

8:00 REGISTRATION GRAND FOYER
10:30

8:30 Concurrent Sessions

SESSION 1 FRANCIS SCOTT KEY
BALLROOM, NORTH & CENTER

SESSION CHAIRMAN: B.G. Bohi
Bethlehem Steel Corp.

- THE NEW INTERACTIVE GRAPHICS
SYSTEM AT CALI AND ASSOCIATES
L. Lowery, Cali and Associates, Inc.

1 THE MOST COMPUTER SYSTEMS -
SHIPYARD APPLICATION
L. Kuh, H.B. Maynard & Co., Inc.

1 INTERACTIVE PARTS DEFINITION PROJECT
R.C. Moore, Newport News Shipbuilding
A.F. Kaun, Newport News Shipbuilding

SESSION 2 FRANCIS SCOTT KEY
BALLROOM, SOUTH

SESSION CHAIRMAN: H.M. Bunch
University of Michigan

- AN APPROACH TO SUCCESSFUL SHIPYARD
PLANNING AND SCHEDULING
S. Knapp, SPAR Associates, Inc.

- PLANNING AND SCHEDULING SHIP
CONSTRUCTION SUBJECT TO LIMITED
RESOURCES
L.C. Deschamps, SPAR Associates, Inc.

1 IMPLEMENTATION OF A PRACTICAL
PLANNING AND PRODUCTION CONTROL
SYSTEM IN SMALL AND MEDIUM
SIZED SHIPYARDS
J.N. Spillane, Shipbuilding Consultants, Inc.

10:00 INFORMAL DISCUSSION PERIOD

10:30 GENERAL SESSION FRANCIS SCOTT KEY
BALLROOM, NORTH & CENTER

SESSION CHAIRMAN: R. Lovdahl
Todd Pacific Shipyards

- 1 INTERACTIVE STEEL STRUCTURE
DEFINITION AND GENERATION: EFFECTS
ON MANPOWER AND LEADING TIME
R. Di Luca, Italcantieri S.P.A.
- 1 A PRACTICAL APPROACH TO USING
STANDARD SOFTWARE PACKAGES
IN SMALL SHIPYARDS
G. Hoffman, St. Louis Ship
- AN INTRODUCTION TO ENGINEERING
MODELS (WITH A CASE STUDY IN THE
SHIPBUILDING INDUSTRY) -
A CHALLENGE
J.W. Rohrer, U.S.A. Models
G.L. Kraine, Sun Shipbuilding and
Dry Dock Company
- 12:00 LUNCH
- 1:30 GENERAL SESSION FRANCIS SCOTT KEY
BALLROOM NORTH & CENTER
SESSION CHAIRMAN: D.J. Martin
National Steel &
Shipbuilding
- 1 PRODUCTIBILITY FROM CONCEPTUAL
DESIGN TO SHIP CONSTRUCTION
I.S. MacDougall A & P Appledore. Ltd.
- COMPUTER ASSISTED PROCESS
MANUFACTURING AND ASSEMBLY -
A FIRST STEP TOWARDS INTEGRATION
A. Houtzeel, Organization for Industrial
Research, Inc.
- 3:00 INFORMAL DISCUSSION PERIOD
- 3:30 GENERAL SESSION FRANCIS SCOTT KEY
BALLROOM NORTH & CENTER
SESSION CHAIRMAN: L.M. Thorell
Todd Pacific Shipyards
- PRODUCTIVITY - MANAGEMENT'S
BONUS (!!) OR FAILURE (??)
F.H. Rack, Shipbuilding Consultants, Inc.
- 1 THE U.S. SHIPBUILDING STANDARDS
PROGRAM - LONG RANGE PLAN
Y. Ichinose. IHI Maxine Technology, Inc.
- 4:30 ADJOURNMENT



APPENDIX B: IREAPS TECHNICAL SYMPOSIUM ATTENDANCE LIST

Baltimore, Maryland

SEPTEMBER 15-17, 1981

A&P APPLIEDORE LIMITED

Northumbrian Way, Killingworth
Newcastle Upon Tyne, ENGLAND

Malcolm Bell
Ship Production Engineer
I. S. MacDougall
Director

ADVANCED MARINE ENTERPRISES

1725 Jefferson Davis Hwy - Suite 1300
Arlington, VA 22202

Barry L. Batchelor
System Analyst
Eric Byler
Systems Analyst
Dave Helgeson
Chief Hull Scientific Sect.
Ricky W. Lee
Sr. Designer
Otto P. Jons
V.P. Engineering

ADVANCED TECHNOLOGY, INC.

1725 Jefferson Davis Hwy - Suite 300
Arlington, VA 22202

Stephen T. Fisher
Senior Program Engineer

THE AMERICAN SHIP BUILDING COMPANY

AMSHIP Div.
400 Colorado
Lorain, OH 44052

Gordon Calvin
VP Planning & Production Control
Ray Francis
Manager-Engineering
Ed Wingenroth
Welding Engineer

ANDERSON ENGINEERS INC.
200 Thelma Drive
Carnegie, PA 15106

Gary L. Schnorrenberg
National Sales Manager

D. APPLETON CO., INC. (DACOM)
P.O. Box 838
Manhattan Beach, CA 90266

A. Wayne Snodgrass
Project Manager

AUTO-TROL TECHNOLOGY
12500 N. Washington
Denver, CO 80233

Walt Simpson
Manager of Applications Dev.

AVONDALE SHIPYARDS INC.
P.O. Box 50280
New Orleans, LA 70150

John Peart
Richard Price

AVONDALE SHIPYARDS INC.
76 Dunlith Ct.
Marrero, LA 70072

Vincent H. Nuzzo
Supt. Mold Loft

BALTIMORE MARINE SERVICES
22 W. Padonia - Suite C252
Timonium, MD 21093

Robert Dennison
Gordon Kinkaid
President
Tom Kneeshaw
VP

BAND, LAVIS & ASSOCIATES INC.
670 Ritchie Highway
Severna Pk, MD 21146

Paul R. Van Mater, Jr
Senior Naval Architect

BATH IRON WORKS
700 Washington Street
Bath, Maine 04530

David Blais

J. R. Erikson
FFG Design Mgr.

J. R. Fortin

J. C. Mason

Richard B. Siek
NC Project Coordinator

D. H. Thompson
Producibility Project Engineer

James R. Vander Schaaf
Supvr. of Planning Systems Development

S. Wolkow

BAY SHIPBUILDING CORP.
605 N. Third Ave.
Sturgeon Bay, WI 54235

Robert H. Miller
VP, Director of Engineering

BETHLEHEM STEEL CORP.
CTD-Sparrows Point Shipyard
Sparrows Point, MD 21219

V. G. Adams
Hull Drafting Dept.

Bruce Bohl
Lead/Programmer/Analyst

Karl E. Briers
System Engineer

Martin Castle
Sr. Designer

Kevin D. Dyer
Sr. Engr.

Edwin Faus
Industrial Engineer

Isaac Gemmell
Chief Electrical Draftsman

Sudarshan K. Gupta
Senior Engineer

Joseph Haslbeck
Chief Machinery Draftsman

Nicholas V. Haynes
supt., Production Engineering

BETHLEHEM STEEL CORP. (continued)
CTD-Sparrows Point Shipyard
Sparrows Point, MD 21219

Art Huge
Shipyard Controller-Accounting Dept.

Henry Jones
Plant Engineer

James P. Kozo
Project Manager

Ed Marcavage
Computer Applications Sect..

William P. McCloskey
General Foreman-Electrical & Sheet Metal

Peter McNair
Planning

Alex Miller
Chief Planner

Mike Miller
Planning

T. L. Mullin
Chief Draftsman

Tahanh Minh Ngo
Computer Applications Sect.

Dan Romanchuk
General Supt.

Gerald Simmons
Pipe Foreman

Frank J. Slyker
Chief, Basic Ship Design

Norm Smith
Supt. Outfitting

John Spies
Computer Applications Sect.

David T. Vermette
Exempt. Supervisor

Dave Watson

BETHLEHEM STEEL CORP.
Shipbuilding
Martin Tower
Bethlehem, PA 18016

Henry A. Baierlein
Supt. Maint. Practices

John C. Estes
Assistant VP, Shipbuilding

Eugene Schorsch
Manager

BRITISH SHIP RESEARCH ASSOCIATION
Wallsend
Tyne & Wear NE28 6UY
ENGLAND

D. R. Patterson

BRITISH SHIPBUILDERS
Benton House, 136 Sandyford Road
Newcastle upon Tyne, NE1 1QE
ENGLAND

George R. Snaithe
Director of Research

CADCOM DIV.
MANTECH INTL CORP.
107 Ridgely
Annapolis, MD

John C. Gebhardt
Chief Scientist

CALCOMP
3320 E. La Palma
Anaheim, CA 92706

Raymond T. Thexton
CAD/COM Manager

CALI & ASSOCIATES, INC.
3101 37th Street - Suite 130
Metairie, LA 70001

Filippo Cali
President

Lonnie Lowery
Consultant

CALIFORNIA STATE UNIVERSITY - L. A.
5151 State University Drive
Los Angeles, CA 90032

Hugh E. Warren
Professor of Accounting
School of Business and Economics

CAMSCO
2171 N. Lake Parkway - Suite 116
Tucker, GA 30084

Joseph W. Wade
Mgr. Eastern Regional Sales

CDI MARINE COMPANY
1725 Jefferson Davis Hwy - Suite 613
Arlington, VA 22202

Donald Atkins
William H. Hunley
Robert Van Buiten

COLLINGWOOD SHIPYARDS
Canadian Shipbuilding & Engineering Ltd.
Collingwood, ONT., Canada

Laurie Moore
Systems Analyst

CORPORATE-TECH PLANNING INC.
John Hart Mansion-The Hill
Portsmouth, NH 03801

Rodney A. Robinson
Executive Staff Member

DAVIE SHIPBUILDING LTD
P.O. 130 Lauzon Levis
Quebec, Canada

M. Donni son
Manager of Engineering
Marc-Guy Letourneau
Designer and Scientific Analysis
Charles Methot
Steel Work Planning Manager

DESIGNERS & PLANNERS
2341 Jefferson Davis Hwy
Arlington, VA 22202

Jon Gude
Computer Specialist
Steve Klomparens
Head, Computer Aided Ship Design

FMC
Marine & Rail Equipment
4700 N.W. Front Avenue
Portland, OR 97208

Walter MacDonald
Manager Marine Operations

THE FRANKLIN RESEARCH CENTER
Division of The Franklin Institute
20th & The Parkway
Philadelphia, PA 19103

L. W. Sandor

GALVESTON SHIPBUILDING CO.
P. O. Box 2660
Galveston, TX 77553

Bruce D. Johnson
Chief Engineer

GENERAL DYNAMICS
Electric Boat Div.
Eastern Point Rd.
Groton, CT 06340

Kenneth D. Brown
Operations Engineering Manager

Thomas F. McCarthy
Principal Engineer

Doug Palmer

David V. Pearson
Chief Engineer

GENERAL DYNAMICS
Electric Boat Div.
Quonset Point Facility
North Kingstown, RI 02852

Victor Sibilla
Chief Central Trade Planning

John M. Wallent
Chief of Automated Processes

GENERAL DYNAMICS
Data Systems Div.
Eastern Pt. Road
Groton, CT 06340

Paul M. Cofoni
Mgr., CAD/CAM
George Panciera
Sr Software Engineer

GENERAL DYNAMICS
Quincy Shipbuilding Div.
97 East Howard Street
Quincy, MA 02169

Russell G. Billard
Design Chief/Mold Loft

Lee A. Denney
IREAPS Representative

Robert B. Geary
Director of Engineering

GENERAL DYNAMICS CORP.
Data Systems Services
12101 Woodcrest Executive Drive
St. Louis, MO 63141

B. J. Breen
Director, CAD/CAM

GENERAL ELECTRIC COMPANY
Industrial Sales Div.
6060 Jefferson Ave. - Suite 8001
Newport News, VA 23605

Martin W. Steffens
Sales Manager

GIBBS & COX, INC.
40 Rector St.
New York, NY 10006

Malcolm Dick

GRUMMAN AEROSPACE
Advanced Marine Systems
Bethpage, NY 11714

Gordon Sammis
Naval Architect

Bob Skirkanich
Sr. Science Systems Analyst

HEMPEL'S MARINE
Ship Bldg. Div.
Foot of Carrie Ave.
Wallington, NJ

J. H. Shubrook
Natl. Sales Manager

J. J. HENRY CO., INC.
West Park Drive
Mt. Laurel Industrial Park
Moorestown, NJ 08057

Edward T. Barry
John H. Klose
Assistant VP
Gordon Planch, Jr.

HYDRONAUTICS, INC.
7210 Pindell School Rd.
Laurel, MD

Stephen J. Daugard
Research Scientist
Thomas M. Sauer
Research Scientist

IHI MARINE TECHNOLOGY INC.
100 Church Street - Suite 1830
New York, New York 10007

Yoshinori Ichinose
VP

IIT Research Institute
10 West 35th Street
Chicago, IL 60616

Edmund R. Bangs
IREAPS Manager
Linda M. Bender
General Chairman, IREAPS Technical Symposium
Victor Fischer
Staff
Margarita Hernandez
IREAPS Librarian

INDUSTRIAL CONSULTANTS, INC.
6726 Sulky Lane
Rockville, MD 20852

M. B. Miller
President
S. J. Miller
Assistant to President

INFORMATION/DOCUMENTATION
Box 17109 - Dulles International Airport
Washington, DC 20041

Michael S. Saboe
Director

INGALLS SHIPBUILDING
Division of Litton Systems, Inc.
P.O. Box 149
Pascagoula, MS 39567

Wesley Eugene Beech
M.S. 2018-07

G. A. Houstein
Design Specialist-M.S. 39567

Bill Hoven
Technical Applications

A. J. Morris
Manager, Interactive Graphics Dept.-M.S. 39567

F. M. Perry, Jr.
VP, Productivity & Operational Evaluation

R. H. Slaughter, Jr.
M.S. 1090-02

M. B. West
Section Manager-M.S. 1013-01

INTERCAN LOGISTICAL
c/o Collingwood Shipyards
Collingwood, ONT. Canada

John J. Dougherty
Vice President

INTERNATIONAL COPPER RESEARCH ASSOCIATION, INC.
708 Third Avenue
New York, NY 10017

L. McDonald Schetky
Tech. Dir. Metallurgy

INTERSHIPPING CONSULTANTS CO.
2507 Red Oak Circle
Springfield, PA 19064

Ralf Ohlin

ITALCANTIERI
Corso Cavour 1
Trieste, Italy

Renzo Di Luca

JACKSONVILLE SHIPYARDS INC.
P.O. Box 2347
Jacksonville, FL 32203

Richard Powell
Production Coordinator

LOCKHEED SHIPBUILDING AND CONSTRUCTION CO.
2929 16th Avenue S.W.
Seattle, WA 98134

O. G. (Otis) Edwards
Production Manager - Yard 1
Gerald A. Flynn
Craft Superintendent-Lofting
L. W. (Bill) Frank
Director of New Construction
Thomas Kuhlmeier
Design Engineer
David E. Todd
Sr. Systems Engineer

LOCKHEED MISSILES & SPACE CO.
P.O. Box 504
Sunnyvale, CA 94088

William Saunders
Staff Engineer

LONG BEACH NAVAL SHIPYARD
Long Beach, CA 90822

Jeffrey D. Arthursd
Naval Architect
Code 250.11 LBNS
Kenneth E. Knollenberg
Supervisory Naval Architect

MARINE INDUSTRIES LIMITED
B.P. 550
Sorel, Quebec, CANADA

Michel Cloutier
Industrial Engineer
Leon Gelinas
Chief Designer

MARINETTE MARINE CORP.
Ely Street
Marinette, WI 54143

William J. Keller
Chief, Steel Design
Gilbert Snyders
VP-Manufacturing
Michael Wade
Production Engineer

MARITIME ADMINISTRATION
Department of Commerce
Washington, DC 20230

Mary B. Arter
Computer Specialist
Office of Ship Construction-Engineering Computer Group

William P. Fannon
Shipbuilding Estimator-Div. of Shipbuilding Costs

John J. Garvey
Acting Director, Office of Advance Ship Dev.

J. David Gessow
Naval Architect - Office of Shipbuilding Costs
Room 4868

Nancy C. Harris
Industrial Specialist (Shipbuilding)

Robert M. Henry
Engineer - Dept. of Transportation

John M. Hotaling
Mgr. Shipbuilding Analysis, Dept. of Transportation

Joyce Isaacs
Computer Programmer, Dept. of Transportation

Freddie T. Johnson
Chief, Engineering Computer Group
Office of Ship Construction

Joseph Kim
Naval Architect

Ronald K. Kiss
Acting Assistant Admin. for Shipbuilding

Alexander C. Landsburg
Mgr. Computer-Aided Cost Analysis
Room 4868

George H. Levine
Assistant Chief, Div. of Naval Arch.

Robert F. McGinn
Shipbuilding Analyst
Office Ship Construction

Robert McNaull
Computer Specialist
Office of Ship Construction-Engineering Group

Gary J. North
Naval Architect
Office of Ship Construction-Room 4059

Thomas R. Premski
Industrial Specialist
Office of Ship Construction

Robert Schaffran
R&D Program Manager
Advanced Ship Development

Michael W. Touma
Naval Architect

Mark Truffer
Contract Administrator
Div. of Domestic Costs

Thomas H. Vodicka
Mgr. Shipbuilding Ops.
Div. of Production

Robert H. Netzel
Industrial Specialist

MARITIME TRANSPORTATION RESEARCH BOARD
National Academy of Sciences
2101 Constitution Ave., N.W.
Washington, DC 20910

John J. Nachtsheim
Executive Director

MARYLAND SHIPBUILDING & DRY DOCK CO.
P. O. Box 537
Baltimore, MD 21203

Saul Levickas
Ship Supvr.
Ray Mills
Foreman-Sheetmetal Dept.
Roy T. Shiflet Jr.
Supv. Technical Computer Ctr.

H. B. MAYNARD
6 Woodmere
Stanford, CT 06905 Louis Kuh

McDERMOTT INCORPORATED
P. O. Box 588
Amelia, LA 70340

Sanjay Beshmukh
Project Engineer
Bill Coneybear
Project Engineer
Janet Granier
Technical Programming Group Leader
Francisco San Miguel
V.P. & Gen. Mgr.
Ken Tabor
NC Coordinator

McDERMOTT INCORPORATED
P. O. Box 128
New Iberia, LA 70560

Richard Adams
Chief Engineer
Tom Verret
Engineer's Aide

McDERMOTT INCORPORATED
1010 Common Street
New Orleans, LA

Maurie B. Marcus
Section Leader

McDERMOTT INCORPORATED
P. O. Box 2249
Gulfport, MS 39503

Lowell Baudouin
Production Coordinator
Dennis Garrard
Supervisor of Project Engineers

JOHN J. McMULLEN ASSOCIATES
Rouse Tower - 6060 Jefferson Avenue
Newport News, VA 23605

Thomas F. Bridges
VP
B. L. Skeens
VP

UNIVERSITY OF MICHIGAN
Dept. of Naval Architecture and Marine Engineers
Ann Arbor, MI 48109

Howard M. Bunch
Associate Professor
Michael Parsons
Chairman, Dept. of Naval Architecture

mitsui ENGINEERING & SHIPBUILDING CO., LTD.
3050 S. Post Oak Road #590
Houston, TX 77056

M. Takizawa

NATIONAL STEEL & SHIPBUILDING CO.
Harbor Dr. and 28th St.
P. O. Box 80278
San Diego, CA 92010

Robert J. Derusha
Director Planning & Production Control
Jorge Krohn
Mgr. Production Engineering
John Lightbody
Director Estimating & Facilities
Douglas J. Martin
Mgr., Research & Development
Donald A. Spanninga
Director, Information Systems Dept.
Jack Wasserboehr
Supervisor-Technical Engineering

OFFICE OF NAVAL RESEARCH
(ONR)
Arlington, VA 22217

Nicholas Perrone

NAVAL MATERIAL COMMAND
Philadelphia, PA 19112

Eugene Zyblíkewycz
Mech. Engr.

HQ NAVAL MATERIAL COMMAND
MAT 064
Washington, DC 203260

William F. Holden
General Engineer

U. S. NAVAL ACADEMY
Naval Systems Engineering
Annapolis, MD

Bruce Nehrling
Professor

NAVAL SEA SYSTEMS COMMAND
Dept. of the Navy
Washington, DC 20362

Philip Anklowitz
Technical Director (Acting) Computer
Support Design

Michael Aughey
Naval Architect

Craig Carlson
Naval Architect

James Claffey
Naval Architect

J. W. Cuthbert
Engineer, Manufacturing and Shipbuilding Tech.
SEA-90M1

Jimmy W. Fuller
Industrial Specialist, Code 07K

Thomas Gallagher
Supv. Naval Architect

Page Glennie
Naval Architect

Thomas Gooding
Naval Architect

Wallin D. Holtgren
Naval Architect

Garly L. Jayne
Deputy Project Manager
PMS 383. B

Jospeh Lucie
Naval Architect

NAVAL SEA SYSTEMS COMMAND (continued)
Dept. of the Naval
Washington, DC 20362

Robert L. Milner
Industrial Engineer

Tosh Nomura
Naval Architect

John Rosborough
Naval Architect

Vincent Santomarino
Naval Architect

Lewis C. Smith
Naval Architect, Code 31241

Ronald Walz
Naval Architect

Richard Weiser
Naval Architect

NAVSEA METAL BR.
12111 Holly Knoll Cr.
Great Falls, VA

Charles L. Null
Welding Eng.

NAVAL SHIP SYSTEMS ENGINEERING STATION
Philadelphia Naval Base
Philadelphia, PA 19112

Thomas Galie
Project Manager

Walter Kollar
Mechanical Engineer, Code 035.1

U.S. NAVY
Office of the Assistant Secretary of the Navy
Reston, VA 22091

A. R. DiTrapani
Director of Ship Programs

Capt. Clyde C. Morris
Asst. Director Ship Programs

James W. Tweeddale
Dir. Productivity Management

U.S. NAVY
Industrial Resources Detachment
Philadelphia, PA 19112

David Fabry
Mech. Engr.
' Bldg. 75

NEWPORT NEWS SHIPBUILDING
4101 Washington Ave
Newport News, VA 23607

M. Brady
Contract Specialist
B. Bridges
Contract Manager
J. L. Camden
Production Control Supvr.
M. L. Garrison
Cost Engineer
J. G. Gemski
Production Control Mgr-X02C Steel Fabr.
B. C. Howser
A. F. Kaun
John A. Lina
Manager, CAD/CAM
Norman T. Monk
Section Manager
Richard C. Moore
Thomas O' Donohue
G. D. Shulenburg
Chief Design Engineer
D. W. Stewart
Manager, Fabrication
Mark I. Tanner
Special Assignment
B. C. Vinson, Jr.
Mold Loft Supv

NKK AMERICA INC
Shipbuilding
450 Park Ave
New York, NY 10022

Shusuke Maeda
Naval Architect
Michinosuke Unozawa
Technical Counselor

NORFOLK NAVAL SHIPYARD
Portsmouth, VA 23709

Gary B. Ettenger
Industrial Engineer
Craig M. Kuehn
Engineering/Comp. Spec. - Code 244-04
W. L. Sawyer, Jr.
Mechanical Engineering Technician
Herman B. Smith
(Engineering Technician-11/10

NORFOLK NAVAL SHIPYARD (continued)
Portsmouth, VA 23709

B. B. Seebo
Industrial Engineering Tech.
Herman B. Smith
Head, Test & Dev. Branch Welding Eng. Div.
Marvin F. Teachey, Jr.
Supervisor of Naval Architects

NORFOLK NAVAL SHIPYARD
3060 Blackstone CT
Virginia Beach, VA 23456

Jim Martin
Project Engineer-Code 3870

NORSHIPCO
P. O. Box 2100
Norfolk, VA 23501

William Blazer
Production Engineer
Les Flora
J. G. Price
Sr. VP of Special Projects

NORTH AMERICAN COMPUTER CONSULTANTS, LTD.
1516 North State Parkway
Chicago, IL 60610

Ernest Anderson
Director of Research & Development

UNIVERSITY OF NOTRE DAME
Haggard Hall
Notre Dame, IN 46556

Chris D. Anderson
Professor of Psychology

NUMERICAL CONTROL APPLICATIONS
A Div. of Upper Lakes Shipping Ltd.
c/o Port Weller Dry Docks
P. O. Box 3011
St. Catharines, Ontario, CANADA

Jesse Harkey
Manager

OFFSHORE POWER SYSTEMS
8000 Arlington Expressway
Jacksonville, FL 32211

Clifford M. Hammond
Mgr. Manufacturing Engineering & Control
Richard A. LaBelle
Manager, Engineering Adm.

Additional copies of this report can be obtained from the
National Shipbuilding Research and Documentation Center:

<http://www.nsnet.com/docctr/>

Documentation Center
The University of Michigan
Transportation Research Institute
Marine Systems Division
2901 Baxter Road
Ann Arbor, MI 48109-2150

Phone: 734-763-2465
Fax: 734-763-4862
E-mail: Doc.Center@umich.edu